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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/836,372	04/18/2001	Takashi Shirasuna	35.G2775	6886

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NEW YORK, NY 10112

EXAMINER

JUBA JR, JOHN

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 03/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/836,372

Applicant(s)

SHIRASUNA, TAKASHI

Examiner

John Juba

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 and 35-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 35-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                 | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>10</u> | 6) <input type="checkbox"/> Other:  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 4, 2002 has been entered.

### ***Errata***

Applicant is asked to make a pen-and-ink correction to the last Office action (paper #8) at Page 4. The first line of the second paragraph, "Hoshi, et al teach" should read - - Yamanishi teaches - - .

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 9, 11, 12 and 35 – 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshi, et al (U.S. Patent number 5,815,320), in view of Yamanishi

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(U.S. Patent number 6,094,313), and further in view of Official notice. Referring to numerical examples 5 – 7, Hoshi, et al disclose a zoom lens system comprising strictly four lens units arranged (+)(-)(+)(-) from the object side, each of the lens units moving toward the object side upon zooming from the wide angle end to the telephoto end. As evident by inspection of Figures 9, 11, and 13 and the corresponding tables, the shape of the surface closest to the image side in the fourth lens unit is convex to the image side. Thus, Hoshi, et al disclose the invention substantially as claimed. However, Hoshi, et al do not disclose at least one diffractive optical surface among the lens units.

In the same field of endeavor, Yamanishi discloses a zoom lens system comprising strictly four lens units arranged (+)(-)(+)(-) from the object side, each of the lens units moving toward the object side upon zooming from the wide-angle end to the telephoto end. Yamanishi teach that even in such cases where the design is well corrected, it is possible and may be *desirable* to enhance correction of aberrations by inclusion of a diffractive optical element (DOE) (Col. 3, lines 9 – 15). In particular, Yamanishi teaches that at least chromatic aberration should be corrected *at each group*, and that a suitable means to do so would be by inclusion of a DOE (Col. 3, lines 58 – 67). Thus, it is believed that Yamanishi fairly suggest a DOE in *each* lens group.

It would have been obvious to one of ordinary skill to include at least one diffractive optical surface in at least one of the lens units of Hoshi, et al, in the interest of enhancing correction of chromatic aberration, as suggested by Yamanishi. Accordingly, Hoshi, et al and Yamanishi suggest the invention substantially as claimed. However, these references do not teach placement of the DOE in the first group on any surface

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but the first surface (from the object side) or in the fourth group on any surface but the last surface (facing the image).

The examiner takes Official notice of the fact that it was well known in the lens art, that fabrication of a diffractive surface is much easier if the base surface flat. However, it was also known that use of a perfectly flat surface may introduce some coma aberration. Accordingly, it was known that a more suitable base surface for a DOE will be selected as one having *some* curvature, but preferably will be a surface having a large radius of curvature. Selection of the larger radius of curvature, and preferably a rotationally symmetric curvature, was known to simplify manufacturing of the DOE, and accordingly reduce the cost of the corresponding element.

It would have been obvious to one of ordinary skill to locate the DOE suggested by Yamanishi in any given lens group of Hoshi, et al on the surface having the largest radius of curvature, in the interest of simplifying fabrication of the corresponding lens element, thus reducing cost, as was well-known. Thus, in the lens system of Figure 9 (Example 5), it appears that the fourth surface ( $R_{18}$ ) in the fourth group, being especially planar would have been the obvious choice.

With regard to claims 2 and 11, Yamanishi suggests correcting chromatic aberrations. One of ordinary skill would have understood these to comprise any or all of axial chromatic aberration, lateral chromatic aberration, and spherochromatism. Thus, Yamanishi fairly suggests each. In the case of axial chromatic aberration, it will be appreciated that the DOE would inherently have comprised as series of concentric, circularly symmetric annular zones, or "phase gratings", as recited.

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With regard to claims 3 and 36, Yamanishi teaches that each unit should be corrected for chromatic aberrations, and in this context suggest that a DOE enhances the correction (Col. 3, lines 58 – 67). Thus, it is believed that Hoshi, et al clearly suggest a DOE in the first lens unit as recited. Thus, in the lens system of Figure 9 (Example 5), it appears that the second surface ( $R_2$ ) of the first lens element, being the most planar of the group, would have been the obvious choice.

With regard to claim 4, given the Abbe numbers tabulated, and noting that the Abbe number of the diffractive element suggested by Yamanishi is inherently negative, chromatic aberration of the lens unit can only have been achieved if the optical power of the refractive elements and the optical power of the diffractive lens were of the same sign. The aggregate will thus have been of the same sign, and the recited relation will have been satisfied.

With regard to claims 5 and 35, the first unit consists of a negative lens with its concave surface facing the object side, and a positive lens in this order from the object side, as illustrated in at least Figure 9 or Figure 11.

With regard to claim 6, the second lens unit of Hoshi, et al comprises of a single negative lens element and an aperture stop.

With regard to claims 7 and 8, the cemented doublet of the third lens unit in Figures 9 and 11 of Hoshi, et al may be considered as one of two positive lens elements used in combination with a single negative lens element.

With regard to claims 9 and 40, each of the fifth through seventh examples of Hoshi, et al employs a fourth lens unit having the recited constitution.

With regard to claim 12, Hoshi, et al fairly disclose a non-illustrated embodiment in which the zoom lens is combined with a camera (Col. 1, lines 51 – 55), and thus fairly disclose an “optical-equipment element” within the specificity recited.

With regard to claim 37, it is clear from the tables that the aperture stop of Hoshi, et al is grouped with and moves as a unit with the second lens unit.

With regard to claim 38, the second lens unit of Hoshi, et al consists of a single negative lens element *and* an aperture stop. In the same field of endeavor, Yamanishi teach the use of an aperture stop in the third lens unit to perform the same function of limiting incident ray heights at the third lens unit. From the two teachings, one of ordinary skill would have recognized that the function could have been performed equally well at either location. Thus, barring any *unexpectedly* improved results arising from the exclusion of an aperture stop in the second lens unit, it appears that one of ordinary skill would have found it obvious to do so, insofar as the aperture would have performed equally as well at the location suggested by Yamanishi.

With regard to claim 39, summing the variable distances D4, D7, and D14 in the fifth example (Fig. 9) of Hoshi, et al, it appears that the distance between the first and fourth lens units is reduced by 0.15 mm upon zooming to telephoto.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshi, et al (U.S. Patent number 5,815,320), in view of Yamanishi (U.S. Patent number 6,094,313) and Official notice, and further in view of Nishio (U.S. Patent number 5,978,153). As set forth above for claim 1, Hoshi, et al and Yamanishi, in view of the

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Official notice then taken, disclose the invention substantially as claimed. However, these references do not disclose the manner in which the diffractive optical surface is to be realized.

In the same field of endeavor, Nishio discloses a zoom lens system having four lens units arranged (+)(-)(+)(-) and a diffractive optical element in one of the moving units (e.g.,  $r_6$  in Example 5). Nishio teaches that when applying diffractive optical surfaces to lenses in such an environment, it is preferable to form the diffractive features by laminating ~~Claims 1, 3, 4, 12, and 35~~ ~~40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshi, et al (U.S. Patent number 5,815,320), in view of Yamanishi (U.S. Patent number 6,094,313).~~ (Col. 15, lines 7+). In this manner, diffraction efficiency is improved, and flare is reduced.

It would have been obvious to one of ordinary skill to provide the diffractive surface in the zoom lens of Hoshi, et al and Yamanishi in the form of laminated diffractive phase gratings of different materials with differing indices, in the interest of providing the greatest diffraction efficiency and reduced flare, as suggested by Nishio.

### ***Response to Amendment***

Applicant's efforts to place this application are noted with appreciation. In particular, Applicant's amendment is sufficient in overcoming both the previous objection to claims 38 – 40 for an informality therein, as well as the previous rejection of claim 40 under 35 U.S.C. § 112, second paragraph.



Applicant's remarks concerning the teachings of the prior art have been fully considered, but are not found persuasive. The claims principally rely upon the particular placement of the diffractive surface among the recited elements. As set forth in the rejection, despite the fact that the combined references do not particularly suggest one surface over another as suitable for bearing the diffractive features, such selection would have been obvious in light of common manufacturing concerns.

### **Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

As a reference intervening Applicant's U.S. filing and foreign priority dates, Ohtake discloses a zoom lens system, (+)(-)(+)(-), with all four groups moving to the object side in zooming from the wide angle position to the telephoto position. There is no DOE.

As a reference intervening Applicant's U.S. filing and foreign priority dates, Enomoto, et al disclose a zoom lens system, (+)(-)(+)(-), with all four groups moving to the object side in zooming from the wide angle position to the telephoto position. There is no DOE.

Nagata (U.S. Patent number 6,157,494) discloses a zoom lens system, arranged (+)(-)(+)(+), with some groups moving to the *image* side in zooming from the wide angle position to the telephoto position. There noteworthy discussion regarding proper placement of a DOE in this system.

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Hasenauer, et al disclose proper placement of a DOE within their zoom lens system.

Nagata (U.S. Patent number 5,978,158) disclose a retro-focus image taking system and discuss appropriate placement of a DOE within the system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (703) 308-4812. The examiner can normally be reached on Mon.-Fri. 9 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on Mon.- Thu., 9 - 5. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
JOHN JUBA  
PRIMARY EXAMINER  
Art Unit 2872

March 21, 2003